EXPLOITING PERFORMANCE-POWER
TRADEOFFS IN SCIENTIFIC COMPUTING
Mathematics and Computer Science Division
Argonne National Laboratory

Argonne National Laboratory invites graduate students and other interested candidates who have at least a bachelor's degree to apply for a temporary appointment in the Mathematics and Computer Science (MCS) Division. As a member of the Laboratory for Advanced Numerical Simulations (LANS), you will work with a team of researchers to develop tools for exploiting performance-power tradeoffs in scientific computing. Current high-end platforms are ensembles of multiple fast CPUs with deep memory hierarchies and high-speed interconnects. Geometric scaling of raw power (Moore's law) arises from more and faster transistors on a chip. However, chips are approaching their packaging thermal limits, and the power-related costs for high-end systems, both electrical power consumed (in megawatts) and machine room cooling loads, continue to grow as a quadratic function of peak execution rates and clock frequencies.

We study the tradeoffs between reducing power consumption and achieving good performance on current and future high-performance architectures with a focus on scientific applications. The project's goal is twofold: we develop explicitly power-aware scientific computing tools for current platforms and provide insights that can be used by the designers of systems software and microprocessors to develop future extreme-scale systems. A component of this work is an outreach and education effort, particularly targeted at women and minority students from the middle school through graduate levels, with the goal of broadening the participation of these groups in computer science, engineering, and computational science. Additional details on the project are at http://www.cse.psu.edu/~raghavan/PxP.html.

The MCS Division offer a marvelous computational environment for this work, including three large Linux clusters, a world-renowned distributed systems laboratory, and a virtual environments laboratory. For more information, see the MCS home page http://www.mcs.anl.gov.

Note that a bachelor's degree is required; opportunities are also available for candidates with a master's or Ph.D. degree. Interested candidates should submit a resume to Jan Griffin at griffin@mcs.anl.gov

Argonne is an equal opportunity employer, and we value diversity in our workforce.